New Jersey Water Monitoring Coordinating Council

NJ-related Water Monitoring Activities

June 2004

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NJDEP Water Monitoring and Standards

NJDEP's Water Monitoring and Standards Program conducts statewide ambient water monitoring consisting of chemical, physical and biological networks. The monitoring covers the state's fresh, ground, marine and tidal waters. Waters are monitored for chemical parameters, biological health, aquatic-related habitat, sediment quality, sanitary quality, shellfish tissue contaminants and phytoplankton. Networks maintained include the Ambient Biological Monitoring Network (AMNET), Ambient Stream Monitoring Network (with USGS), Fish IBI Network, Ground Water Monitoring Network (with NJGS), Coastal Water Quality Monitoring Network, and the Phytoplankton Monitoring Network. Additionally, in 2004, WM&S will be starting an Ambient Lakes Monitoring Network. The program also conducts targeted monitoring in order to answer specific questions or address specific problems (e.g., TMDL development, pollution source trackdowns, spill responses). As per the 2003 EPA "Elements of a State Water Quality Monitoring and Assessment Program" guidance, in 2004 NJDEP will be developing a comprehensive long-term monitoring program strategy for the State.

Additional information on the water monitoring activities of NJDEP's Water Monitoring and Standards Program, including publications and monitoring data, can be found on its website: http://www.state.nj.us/dep/wmm.

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◆ NJDEP NJ Geological Survey

New Jersey Ambient Ground Water Quality Monitoring Network - The Ambient Ground Water Quality Monitoring Network (AGWQMN) is an NJDEP/USGS cooperative project. The original (pre 1999) network mainly focused on determining ground-water quality as a function of geology throughout New Jersey using private residential wells. The goals of the nearly complete redesigned network are to determine the status and trends of shallow ground-water quality as a function of land use related non-point source pollution in New Jersey. This network consists of 150 wells screened at the water table that are sampled 30 per year on a 5-year cycle. The New Jersey Geological Survey (NJGS) manages the network design, well installation, well maintenance and data interpretation and reporting. The NJDEP Bureau of Fresh Water and Biological Monitoring and the USGS collect the well-water samples, and the USGS laboratory in Denver, Colorado analyzes them. Chemical and physical parameters analyzed at each well include: field parameters such as pH, SC, DO, T and alkalinity; major ions, trace elements, gross-alpha particle activity, volatile organic compounds, and pesticides. The ground-water quality data are currently available in the annual USGS Water Resources Reports for New Jersey and online at the USGS NWIS database at http://waterdata.usgs.gov/nwis/. These data are projected to be available in the spring of 2004 on the NJDEP website in an I-Map format with geologic and other coverage's and as an NJGS Informational Circular report that presents and interprets findings in the New Jersey Coastal Plain.

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◆ NJDEP Division of Fish & Wildlife

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◆ NJDEP Division of Watershed Management

The Office of Outreach and Education in the Division of Watershed Management is responsible for the coordination of the Volunteer Monitoring Program, Watershed Watch. Watershed Watch Network is a program acting as an umbrella for all of the volunteer monitoring programs within NJ. The Watershed Watch Network has two advisory committees, Data Users and Water Resource Managers make up the Internal Advisory Committee and Volunteer Monitoring Program Managers throughout the State make up the Watershed Watch Network Council. A

four-tiered approach has been developed to allow for volunteers to pick their level of involvement based on what the purpose of their monitoring program is, what the intended data use is and who the intended data users are. The goal of this new program is to provide acceptable protocols and QA/QC requirements for volunteers if they chose to submit their data to the NJDEP, to assist volunteers in designing and building upon their existing programs, as well as assist data users in gathering sound data for their uses.

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◆ NJDEP Site Remediation and Waste Management Program

The Site Remediation and Waste Management Program (SRWMP) in the New Jersey Department of Environmental Protection (NJDEP) is responsible for the remediation of contaminated sites and for the operation and on-going monitoring of the New Jersey's landfills and resource recovery facilities. Currently there are over 12,000 sites on New Jersey's *Known Contaminated Site List (2001)*. Sites undergoing remediation are required to do an evaluation of all effected media, including soil, ground water and if potentially impacted, surface water, sediment and on occasion, tissue sampling. This is done on a site-by-site basis. All of the data gathered through remedial activities are required to be submitted electronically and uploaded onto the HAZSITE database. This information is currently available internally to NJDEP with plans, in the very near future, to make the information available to the public through the NJDEP's I-MapNJ capabilities.

SRWMP Web Site: www.nj.gov/dep/srp

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◆ US Geological Survey – NJ District

The Hydrologic Data Assessment Program (HDAP), within the USGS, in cooperation with other federal, state, county and municipal agencies, and water authorities collects hydrologic data from across New Jersey. The data are analyzed and published in the annual USGS Water Resources Data- New Jersey report series as a 3 volume set- surface water, groundwater and water quality. Data are also available on the internet, from the National Water System Information (NWIS) database, at http://waterdata.usgs.gov/nj/nwis/.

Continuous records of streamflow and stage are collected at 98 gauging stations on streams in non-tidal areas. Real-time data are available on the internet for 79 of these gauging stations at http://nj.usgs.gov . Continuous records of stage only are recorded at five additional gauging stations. A network of 100 crest-stage gages in non-tidal areas record peak stage between visits and peak flows are computed for the purpose of flood frequency analysis. The Hydrologic Studies Program and HDAP collect continuous records of water surface elevation at 32 sites on tidal rivers and estuaries and peak water surface elevation between visits at 29 stations. Instantaneous measurements of streamflow are made at 95 stream sites at baseflow conditions for 4 projects. Instantaneous measurements of streamflow are also made under various streamflow conditions for 2 other projects. A network of observation wells are operated to record water levels in aquifers underlying NJ. A continuous record of water level is recorded at 94 wells. A Record of minimum and maximum water level between visits is recorded at 17 wells. Water levels are measured manually at an additional 62 wells.

USGS, in cooperation with the NJDEP, collects water quality samples quarterly at 116 stream sites throughout New Jersey's 20 watershed management areas. Physical parameters– water temperature, specific conductance, dissolved oxygen, pH and alkalinity-- are measured in the field. Samples are analyzed for major ions, nutrients, suspended solids, volatile organic compounds, pesticides, and trace elements. Bottom materials are sampled at 22 of the network sites for metals, inorganic and organic carbon, and polyaromatic hydrocarbons. Another NJDEP/USGS cooperative project collects ground water samples from 30 wells each year. These samples are analyzed at the lab for Gross alpha radioactivity in addition to most of the other constituents analyzed in the surface water samples.

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◆ Delaware River Basin Commission

The Delaware River Basin Commission conducts or oversees a variety of monitoring programs within or along the Delaware River. These include:

DRBC Toxics Program - This Program has been ongoing since 1993. Yearly surveys are conducted at five stations in the tidal and at three sites in the non-tidal Delaware River for fish samples for the analysis of PCB Congeners, metals and pesticides.

DRBC Water Use Inventory - This program has been operated by the DRBC since 1987. The inventory is done annually and includes all consumptive water users of over 10,000 gpd in the Delaware River Basin. Electronic and hard copy reports are available upon request.

DRBC Boat Run Program - This sampling survey has been conducted by the DRBC in some form since 1967. At present, sampling occurs at 22 mid-channel locations in the mainstem tidal portions of the Delaware River from Trenton, NJ to the mouth of Delaware Bay from March through November. Parameters include fecal coliforms, Enterococcus, E. coli, conventional pollutants, Nutrients, VOC's, Algal parameters and metals. Bacterial data are placed on the web at www.drbc.net.

DRBC Daily Hydrologic Report - This program was initiated by DRBC in 1985. Hourly readings are collected from tributaries and the mainstem Delaware River regarding daily flow, NYC Reservoir Storage and Estuary Chloride levels are collected from 6 automatic monitors funded by the DRBC and maintained by the USGS. Weekly tabulated data is available at www.drbc.net.

DRBC Scenic Rivers Monitoring Program - This program performs upper basin monitoring from Hancock, NY to the Delaware Water Gap. This program is done in concert with the U.S. Park Service. Parameters include conventionals, flow, nutrients and ecological parameters.

DRBC Lower Delaware and Biomonitoring Program - DRBC initiated pilot water quality studies for the Lower Delaware Monitoring Program (LDMP) in 1998. Since 2000, the purpose of the LDMP has been to determine existing water quality (EWQ) of the non-tidal Delaware River between the Delaware Water Gap and the head of tide at Trenton, NJ, and to determine whether this reach is worthy of the Special Protection Waters (SPW) classification. Under this program, ambient water samples are collected at 9 Delaware River sites (Interstate Control Points) and 15 tributary sites (Tributary Boundary Control Points) near their confluence with the Delaware River. Sample collection occurs bi-weekly during the period of May through September resulting in 10 samples per site per year. These samples are analyzed for 21 parameters composed of 13 conventional, 5 nutrient, and 3 bacterial parameters. Along with water quality samples, the Commission also collects stream discharge data for numerous un-gauged tributaries in order to calculate pollutant loads. DRBC is currently entering the fifth year of this five-year study to define EWQ and to develop protective water quality targets. In the future, this program will continue to support maintenance of EWQ, monitor trends, and either protect high water quality at current levels or improve water quality where necessary.

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◆ USEPA Region 2 – Monitoring and Assessment Branch

USEPA Region 2, DESA/MAB conducts or oversees monitoring activities in the following areas in NJ:
Bioassessment – estuarine, lakes protocol and stream bioassessment studies are performed

Regional Environmental Monitoring and Assessment (REMAP) Projects – A variety of REMAP-sponsored investigations have occurred in NJ including several types of assessments in the NY/NJ Harbor, land use/water quality assessments the Cohansey-Maurice watershed in southern New Jersey, and studies in Barnegat Bay focusing on nutrients, water quality parameters, sediment toxicity and contaminants, and benthic community structure.

Coastal Ambient Monitoring - The ongoing coastal water quality monitoring program consists of three sampling networks – Surface Water, Beach Station and Phytoplankton - and one floatable surveillance network. *Surface water* samples are collected 3-4x/year at 41 stations from Sandy Hook to Cape May, and in Delaware Bay. The samples are analyzed (by NJDEP) for chlorophyll, salinity, nitrate, nitrite, ortho-phosphate, ammonia, total nitrogen, and total suspended solids. *Beach Station Network* - samples are collected from 44 NJ stations to provide bacteriological information on swimmability. *Phytoplankton Sampling* - samples are collected from 8-12 stations for phytoplankton and chlorophyll a to determine if algal blooms are present in NJ coastal waters and bays. Subsets of the samples collected in Barnegat Bay are provided for the identification of the brown tide organism, A. anophagefferens. *Perpendicular Dissolved Oxygen Network* – 4-5 stations are monitored 8-10 times a summer for dissolved oxygen levels and temperature to provide early detection of depleted oxygen conditions. *Floatable Surveillance Network* - overflights are made 6 days/week during the summer to provide aerial surveillance of floating debris in the NY/NJ Harbor complex.

Delaware River Bacteriological Sampling and Analysis - At the request of the Delaware River Basin Commission (DRBC), surface water samples are collected at low slack tide at four sites along the Delaware River three times during the summer. All samples are analyzed by a contract laboratory for bacteria, algae, metals, dissolved oxygen and organic carbon. This sampling enhances DRBC's long-standing water quality sampling program in the Delaware Estuary.

Regional Geographic Initiative Projects - Funding was used in 1999 to sample and analyze shellfish from 3 - 4 locations in Raritan Bay/Sandy Hook Bay. Analytical data for metals and PAHs were used by NJ when making a decision to re-open the beds for shellfishing.

National Shellfish Sanitation Program Support - DESA samples and analyzes samples from ten stations along the northern NJ coast and analyzes samples from eighteen stations in Raritan Bay for total and fecal coliforms. These data are needed by NJ and ISC to determine the status of shellfish beds.

National Study of Chemical Residues in Lake Fish Tissue - EPA-HQ conducted a national study of chemical residues in fish in lakes and reservoirs throughout the U.S. in 1999 through 2002. Lakes were randomly selected. Six lakes in NJ have been identified as potential sampling locations. Two lakes were sampled.

New Jersey Comprehensive Coastal Water Quality Information Network (EMPACT Project) - A joint effort between EPA Region 2, NJDEP, and local health departments, this project will provide information on the basic water quality parameters, toxic pollutants, bacteria levels and beach swimmability. Basic water quality monitoring will be accomplished by deploying data sondes in four key locations in the estuarine waters of the Atlantic County and Cape May County, New Jersey. The final component of the project will be the development of a web site to communicate existing routine monitoring activities along the southern New Jersey coastal bathing beaches to the public.

Website for additional information: http://www.epa.gov/region02/desa/monitor/ (Region 2, DESA's Web Page)

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◆ New Jersey Marine Sciences Consortium

The NJ Marine Sciences Consortium (NJMSC) conducts part of NJ's portion of the National Coastal Assessment, a five year study for determining water and sediment quality in all coastal embayments in NJ. Routine water column and sediment chemistry data are collected (temp, DO, salinity, light penetration, turbidity, suspended solids, nutrients) as well as water/sediment bulk

chemistry for toxics (metals and organics). Sediment toxicity testing, body burdens and fish pathology are also conducted.

Additional information regarding the NJMSC may be found on its website: www.njmsc.org/

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◆ Rutgers University – Institute for Marine & Coastal Sciences

The Institute of Marine and Coastal Sciences (IMCS), at Rutgers University, collects water quality data in estuarine and coastal waters of New Jersey as part of independent federally-funded research projects, student theses, and other initiatives. Affiliated laboratories at Sandy Hook, Tuckerton, and Bivalve also collect water quality data when conducting a multitude of research projects. In addition, IMCS is the managing agency for the Jacques Cousteau National Estuarine Research Reserve (JCNERR), which collects physical, chemical, and biomonitoring data in the Mullica River-Great Bay Estuary, Little Egg Harbor and contiguous waters, as well the coastal ocean using guidelines established by the National Estuarine Research Reserve System. Furthermore, the JCNERR collects meteorological data at the Rutgers Marine Field Station near Tuckerton and at Stockton College. Commencing in the summer of 2004, IMCS will be collecting data at two, long-term, water quality monitoring stations for the Barnegat Bay Estuary Program using 6-Series, YSI data loggers.

IMCS has established a Long-term Ecosystem Observatory (LEO) along the inner continental shelf off the coast of New Jersey to continuously monitor physical, chemical, and biological conditions in the dynamic coastal ocean. It is important to note that IMCS is involved in the development of the Ocean Observing System which will play a key role in the collection and transfer of water quality and other oceanographic data in future years.

Rutgers has been monitoring water quality parameters (temperature, salinity, turbidity) at a site within the JCNERR since 1976. Beginning in 1996, the reserve broadened its monitoring of water quality parameters to record salinity, turbidity, water temperature, dissolved oxygen, pH, and tidal variation. Data are collected in half-hour increments at four sites along a transect from fresh river waters to the open estuary: Lower Bank and Chestnut Neck in the Mullica River, as well as Buoys 126 and 139 in Great Bay. In addition, Buoy 115 in Little Egg Harbor has been established as a long-term monitoring site. Data collected at the array of monitoring stations has been helpful in addressing short-term and long-term episodic events in the estuarine waters, including patterns of circulation and the effects of upwelling events detected on the inner continental shelf by LEO equipment. These data have also been valuable in research investigating the results of upwelling on larval fish transport in the estuary and general patterns

of species distribution within the estuary. Meteorological conditions including wind speed, direction and velocity, solar radiation, barometric pressure, and humidity are recorded and made available as real time data on the Rutgers University Coastal Ocean Observation Laboratory (COOL) web site. A similar meteorological data set is collected at Stockton College.

The major goal of water quality monitoring in the JCNERR, as a component of the National Estuarine Research Reserve System, is to identify and track short-term variability and long-term changes in the integrity and biodiversity of representative estuarine ecosystems and coastal watersheds for the purpose of contributing to effective national, regional and site specific coastal zone management. The data can be used for the following objectives: (1) to support state-specific non-point source pollution control programs by establishing local networks of continuous water quality monitoring stations in representative protected estuarine ecosystems; and (2) to develop a nation-wide database on baseline environmental conditions in the NERR system of estuaries.

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◆ Rutgers University – Meadowlands Environmental Research Institute

Monitoring by the Meadowlands Environmental Research Institute covers the Hackensack Meadowlands area. Waters monitored include mostly brackish river, creeks and wetlands, plus a couple of freshwater ponds/marshes. Types of monitoring that are done are chemical/physical, and biological. Sample types collected include: surface water grab samples, surficial sediments and sediment cores for chemical analysis, surficial sediment for benthic analysis, as well as fish/crab tissue.

Website for additional information: http://cimic.rutgers.edu/meri

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◆ New Jersey Water Resources Research Institute

Water-related monitoring and research funded by the Institute includes several kinds of monitoring activities being carried out by students, as part of their research projects, associated with the Water Resources Research Institute. Examples include: monitoring stream invertebrates in 15 streams in northeastern New Jersey; measuring nitrogen mineralization and denitrification rates in the soils of the same sites as the stream invertebrate work, as well as monitoring of water tables by automated data collection wells at these same sites. Additionally, monitoring of plant establishment in salt marsh restorations in the New Jersey Meadowlands, as part of a larger project monitoring the success of wetland restorations in the Meadowlands, is also underway.

Website for NJWRRI for additional information: http://njwrri.rutgers.edu

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◆ Interstate Environmental Commission

Ambient and Effluent Water Quality Monitoring In New Jersey And Interstate (NJ-NY) Waters - The Interstate Environmental Commission (IEC) conducts an extensive monitoring program of municipal and industrial wastewater discharges, as well as ambient water quality surveys in its tristate District. IEC's laboratory performs analyses on samples collected at these wastewater treatment facilities in addition to samples from many waterways throughout the Interstate Environmental District. IEC conducts scheduled and reactive sample collection programs in response to regulatory compliance, major infrastructure failures, wet weather conditions, and the need for information on dissolved oxygen and pathogens. Field inspections of CSOs, SSOs and MS4s are conducted during dry weather to discover any illegal discharges and take steps to have them remediated. With regards to New Jersey, the Commission samples point sources in New Jersey, and ambient waters in both New Jersey and interstate (NJ-NY) waters. IEC also samples New York sources that affect New Jersey's waters. In New Jersey, IEC samples municipal and industrial wastewater discharges; CSOs; microbiological sampling in New Jersey's shellfish depuration waters in Raritan and Sandy Hook Bays (reactive sampling under "worst case" conditions); pathogens (including enterococcus) in interstate and New Jersey ambient waters (Newark Bay; Hackensack, Passaic, Elizabeth, Rahway and Raritan Rivers; Arthur Kill; Kill Van Kull; Raritan Bay; and Sandy Hook Bay). IEC also performs reactive emergency sampling such as during the 2003 blackout and the 2003 major sewage pipe break in the MCUA drainage basin.

Website for additional information: www.iec-nynjct.org/

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◆ NJ Pinelands Commission

Since 1990, the Commission has contracted with the USGS to monitor stream flows at five sites in the Great Egg Harbor River basin in Monroe Township. A similar program has been conducted at 10 sites in the Mullica River basin since 1991. The objective of both programs, which are funded by the Monroe Municipal Utilities Authority and the Camden County Municipal Utilities Authority, is to assess the hydrologic effect of interbasin transfer of wastewater. The stream flow data are analyzed periodically to determine if significant trends are occurring.

As part of the CCMUA-Mullica River basin program, ambient water-quality data were collected by the USGS at eight sites from 1990 to 2001. Under contract with the Commission, the USGS sampled water quality from 1995-1998 at another ten Mullica River basin sites. The Mullica River basin ambient water-quality network added to an existing network established throughout the Pinelands in the late 1980's and early 1990's by the Commission in cooperation with the counties of Atlantic, Burlington, Cape May and Ocean.

The Commission's water quality monitoring efforts complement a biological monitoring program conducted throughout the Pinelands. The objective of the biological monitoring program is to characterize the effect of existing land-use patterns on selected aquatic and wetland resources and to monitor long-term changes in these resources. Biological indicators include wetland and stream vegetation, fish, and anurans (frogs and toads). Specific conductance and pH are also monitored as part of this program. Assessments of the water resources of the Mullica River basin and the Rancocas Creek basin have been completed. Assessments of the Great Egg Harbor River and Toms River are underway. The Commission's research office is currently completing a study of the effect of cranberry agriculture on wetland landscapes, stream hydrology, and aquatic communities (vegetation, macroinvertebrates, diatoms, and fish), and recently initiated a study of the relationship between land use and fish, vegetation, and anuran communities in Pinelands impoundments.

A major goal of the Commission's monitoring efforts is to make the results readily available to the public; the results of all completed projects have been presented in journal articles and

Commission publications. Website for more information:
www.state.nj.us/pinelands/science/scintro.htm

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◆ Monmouth County Health Department

Monmouth County Health Department (MCHD) collects a variety of data as part of its water monitoring activities. Benthic macroinvertebrate samples are collected in the Spring and Fall. Surface water parameters for monitoring stations (66) within the county are fecal coliform, pH, turbidity, total suspended solids, ammonia, and total phosphorus. The MCHD has implemented specific monitoring programs for Manasquan River and Monmouth Park surrounding waters as well. Recreational bathing samples (Cooperative Coastal Monitoring Program) from fresh, estuarine and coastal waters are taken weekly in the summer (and less frequently off-season) at 61 stations and are analyzed for fecal coliform and/or enterococcus. Identification and enumeration of phytoplankton, and, in addition, field measurements of dissolved oxygen, temperature, salinity are prompted by reports of water discoloration.

MCHD laboratory data were accepted by the NJDEP through its solicitation for water quality data in the NJ Register on May 21, 2001 for use in the NJ Integrated Water Quality Monitoring and Assessment Report. Quality Assurance Project Plans (QAPPs) for Ambient Water Monitoring and for Rapid Bioassessment Protocol (benthic macroinvertebrate samples) were approved as a prerequisite for the data to be accepted for this purpose. Data are available to the public on the County's website at:
www.visitmonmouth.com/health/environmental/water/ambients/index.asp.

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◆ National Oceanic and Atmospheric Administration

National Status and Trends (NS&T) Program - NOAA initiated the National Status and Trends (NS&T) Program in 1984 to determine the status of and to detect changes in chemical contamination, and its associated adverse biological effects, in U.S. coastal waters and estuaries. The program responds to the legislative requirements and institutional mandates of NOAA. The Mussel Watch Project, which is part of this program, routinely measures a broad suite of chemical contaminants in bivalve tissues collected nationwide (ca. 224 core sites), with sites off the Atlantic Coast of New Jersey, in Hudson-Raritan Estuary, and Delaware Bay. The monitored chemicals include toxic metals and metalloids, organochlorine pesticides, PCBs, and PAHs. Additional contaminants such as dioxins and furans are measured on a site-specific basis, and in recent years measurements of flame retardant chemicals (PBDEs), stain repellent chemicals (PFOS), surfactants (APEs) and pharmaceuticals have also been made in geographically limited areas, although not necessarily in bivalves.

The program also conducts regional studies (Bioeffects Studies) to assess the spatial extent and severity of coastal contamination and its association with adverse biological effects in close collaboration with coastal states or regional organizations. These studies are geographically comprehensive and are based on the Sediment Quality Triad approach, i.e., using weight of evidence as the basis for interpreting data. Such studies have been carried out in over 25 different estuaries and coastal bays, including Hudson-Raritan Bay, New York-New Jersey Harbor, and Delaware Bay. The NS&T Program also works to determine the relationships between contaminant levels and "biological effects" at different levels of biological organization. Over the past 15 years, the NS&T Program has sponsored studies to apply or further develop over 30 different biomarkers and ecological indicators as environmental assessment tools.

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◆ NJ Water Supply Authority

The New Jersey Water Supply Authority supplies water to 11 water purveyors in Central New Jersey through the Delaware and Raritan Canal and the Raritan Basin. The Raritan Basin system consists of two reservoirs: Spruce Run, an in-line reservoir, and Round Valley, a pumped-storage reservoir. Purveyors take water directly from either the river or the canal. In the late 1990s, stakeholders in the Raritan Basin began meeting to encourage watershed planning for the basin to protect the water supply. Under a memorandum of agreement with NJDEP, the Authority facilitated the development of the Raritan Basin Watershed Management Plan, completed in 2002. Through the characterization and assessment phase, the USGS worked with data collected from NJDEP's AMNET program to assess the water quality status and pollutant loadings of the

system. As a result, the Authority has decided to support water quality monitoring at 3 stations. Watershed Associations provided biological assessment data for the characterization, as well. The Authority has decided to undertake implementation of several strategies resulting from the plan. Through various grants, the Authority is working on regional stormwater management plans, BMPs to reduce sediment sources to the canal, stream restorations, pollution prevention education, among others. The Authority plans to collect and/or use data from other organizations to determine the effectiveness of these activities, when appropriate.

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